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EXAMINER	
SURVILLO, OLEG	
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2442	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/816,358	JUNG ET AL.	
	Examiner	Art Unit	
	OLEG SURVILLO	2442	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/18/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission dated December 30, 2009 has been entered.

Response to Amendment

2. Claims 1-39 remain pending in the application. Claims 1-10, 12-14, 16-19, 32-35, 38, and 39 are currently amended. No claims have been canceled. No new claims have been added.

Response to Arguments

3. With regard to applicant's remarks dated December 30, 2009:

regarding the rejection of claim 39 under 35 U.S.C. 112, second paragraph, applicants' amendment to remove questionable limitation has been fully considered and is sufficient. Therefore, the rejection has been withdrawn.

Regarding the rejection of claims 1 and 33 under 35 U.S.C. 102(b), applicants' arguments have been fully considered but are moot in view of the new grounds of rejection.

At point 1), applicants argue that "Examiner has inadvertently ignored several express recitations of independent claims 1 and therefore has not met his burden to establish a prima facie case of unpatentability for independent claim 1".

In response to applicant's argument at point 1), it is noted that new grounds of rejection cover every claimed limitation, including newly added limitations of claim 1, as discussed fully in the reasons for rejection. Therefore, applicant's argument cannot be held as persuasive.

At point 2), applicants argue that "dependent claim 3 is independently patentable".

In response to applicant's argument at point 2), examiner disagrees. New grounds of rejection apply to claim 3, including 35 U.S.C. 112, first and second paragraph rejections, as discussed below under appropriate heading.

At point 3), applicants argue that dependent claims 8 and 13 are independently patentable. Examiner disagrees and noted that new grounds of rejection apply.

At point 4), applicants argue that "dependent claims 9, 12, 14, and 15 are patentably because of rejection based on improper 103(a) reference". Examiner disagrees for the same reasons as presented in the Advisory action dated 11/02/09. However, for the purposes of advancing the prosecution, new grounds of rejection apply for the recited claims.

At point 5), applicants present arguments pertaining to claims 17, 19, 25, 28, 30, 31, 33, 34, and 38 that are analogous to those arguments addressed just above and are not addressed separately for the sake of brevity.

As to any arguments not specifically addressed, they are the same as those discussed above.

Information Disclosure Statement

4. The information disclosure statement dated December 18, 2009 fails to comply with the provisions of 37 CFR 1.98 and MPEP § 609 because document listed under section U.S. Patent Application Documents are not identified by a U.S. Patent Application Publication Number, as required by column heading. As a result, this document has not been considered.

Specification

5. The application contains disclosure entirely outside the bounds of the claims. Applicant is required to modify the brief summary of the invention and restrict the descriptive matter so as to be in harmony with the claims (MPEP § 1302.01).
In particular, it appears that only disclosure of section II. AGGREGATING MOTE-ASSOCIATED INDEX DATA (pages 14-18 of the specification) and partially the disclosure of section I. MOTE-ASSOCIATED INDEX CREATION (pages pertaining to the description of Fig. 2 and Fig. 4) is relevant to the subject matter of claims 1-39, as presently claimed. The rest of the specification describes the subject matter of the co-pending applications wherein the name of each section in the specification corresponds to the name of each of the co-pending applications. Applicants are reminded that the subject matter of later sections of the specification (sections III, IV, and V.) is actually

included through their incorporation by reference of the related/parent applications, as mentioned in the beginning of the specification (pages 1-4). As a result, providing a detailed description of the subject matter of co-pending applications is redundant and must be removed from the current application.

This objection was requested by applicants to be held in abeyance until allowable subject matter is indicated, pursuant to 37 CFR 1.111(b), in supplemental response dated November 5, 2008.

6. The specification is objected to under 37 CFR 1.75(d)(1) as failing to provide a clear support or antecedent basis in the description for amended claims, as discussed below with respect to the written description requirement.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 17 and 38 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The use of the word “mote” does not inherently mean that the claim is directed to a machine. Only if at least one of the claimed elements of the mote is a physical part of the mote can the mote as claimed constitute a machine within the meaning of 35 U.S.C. 101.

Since the specification fails to provide a specific definition of a “mote” as including at least one physical part, instead relying on exemplification of what a mote could be, the claimed mote may be reasonably interpreted as comprised of software per se. Therefore the claim is rejected as a system of software per se, failing to fall within a statutory category of invention. In particular, a mote is claimed to comprise only an agent. In at least one embodiment such "agent" is a computer program resident in a mote. See specification at page 15.

It is noted for the purposes of advancing prosecution that amending claim 17 to incorporate the limitations of claim 19 would render claim 17 statutory under 35 U.S.C. 101 since claim 19 specifically states that the mote in the second set of motes comprises a device formed in a substrate having at least two of a semi-autonomous computing functionality, a communication functionality, or a sensing functionality.

As to claim 38, applicants are advised to amend the claim analogously to claim 17 by stating that the first mote comprises a device formed in a substrate having at least two of a semi-autonomous computing functionality, a communication functionality, or a sensing functionality. Such amendment would render the claim statutory under 35 U.S.C. 101.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 1-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

As to claim 1, the limitation of “aggregating, in at least one mote in a second set of motes, at least a part of one or more mote-addressed content indexes from a first set of motes, wherein the first set of motes is administered by a first network administrator owned or controlled by a first legal entity and wherein the second set of motes is administered by a second network administrator owned or controlled by a second legal entity” has not been described in the specification. In particular, the specification only discusses aggregating in at least one mote one or more mote-addressed content indexes from the same set of motes. See embodiment of Fig. 4. The specification further discusses having the first set of motes being administered by a first network administrator owned or controlled by a first legal entity and the second set of motes being administered by a second network administrator owned or controlled by a second legal entity. See embodiment of Fig. 8. Page 25 of the disclosure states that "the first and/or second administrators tend not to have any significant knowledge of the internal operations of networks they don't administer". It is nowhere mentioned that a mote of one set of motes aggregates content indexes from another set of motes that is administered by a different network administrator as that would defy the purpose of having two separate sets of motes. It appears that applicants attempt to combine two

separate embodiments of Figs. 5 and 8 to perform the method that was not originally disclosed.

As to claim 17, the limitation of "an agent to aggregate on a mote in a second set of motes at least a part of one or more mote-addressed content indexes corresponding to a first type of content from a first set of motes, wherein the first set of motes is administered by a first network administrator and the second set of motes is administered by a second network administrator" has not been described in the specification. Analogous reasons apply as those discussed with respect to claim 1 above.

As to claim 33, among other limitations analogous to those of claim 1, the limitation of "said reporting entity being operable to report an aggregation of at least a part of one or more mote-addressed content indexes from the first set of motes and second set of motes, and wherein the first set of motes is administered by a first network administrator and wherein the second set of motes is administered by a second network administrator" has not been described in the specification. In particular, the specification discloses each set of motes having its own reporting entity, such as 902 and 904 in Figure 9. There is simply no disclosure of a reporting entity reporting indexes from two separately administered sets.

As to claim 34, the limitation of "at least one multi-mote index creation agent resident in said at least one mote configured to index content of a first set of motes and a second set of motes, wherein the first set of motes is administered by a first network administrator owned or controlled by a first legal entity, and wherein the second set of motes is administered by a second network administrator owned or controlled by a second legal entity" has not been described in the specification. Analogous reasons apply as those discussed with respect to claim 1 above. In particular, it has not been disclosed that a mote of one set of motes is indexing the content of motes belonging to another set of motes that is differently administered.

As to claim 38, the limitation of "at least one multi-mote registry resident in said first mote having one or more indicators of a second mote's content to be indexed, wherein the first mote is administered by a first network administrator and the second mote is administered by a second network administrator" has not been described in the specification. Analogous reasons apply as those discussed with respect to claim 1 above. In particular, it has not been disclosed that a first-administered mote has any indicators of a mote that is differently administered.

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1-32 and 34-37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 1 and 17, the limitation of “aggregating, in at least one mote in a second set of motes” is ambiguous because it is unclear whether aggregating is performed in at least one mote **of** a second set of motes (emphasis added) or aggregating is performed in at least one mote **and/or in** a second set of motes (emphasis added). Appropriate correction or explanation is required. If applicants decide to amend this limitation, applicants are reminded to make analogous amendment to the preamble of claims 2, 3, 10, 13, and 16.

As to claims 1 and 34, the limitation of "the first/second set of motes is administered by a first/second network administrator owned or controlled by a first/second legal entity" is ambiguous because it is unclear whether a set of motes is owned/controlled by a legal entity or a network administrator is owned/controlled by a legal entity. Appropriate correction or explanation is required.

As to claim 2, it is unclear whether “a second mote” is the same as “at least one mote” of claim 1 or “a second mote” is a different mote. In a later case, it is unclear which mote is “a first mote”.

As to claim 3, it is unclear whether "aggregating, on a second mote" is the same or different from "aggregating, in at least one mote" of claim 1. It appears that the limitation of "aggregating, on a second mote, at least a part of one or more mote-addressed content indexes from the first set of motes" has been effectively incorporated into claim 1 by the latest claim amendment. Therefore, above-recited limitation of claim 3 is redundant and does not further limit the parent claim. Appropriate correction or explanation of how "on a second mote" is different from "in at least one mote" is required.

It is further unclear how aggregated at least a part of one or more mote-addressed content indexes from the **first set** of motes (emphasis added) allows for creation of "one or more multi-mote content indexes of the **second set** of motes (emphasis added) as amended. It appears that the claim is either missing a limitation or incorrectly refers to a set of motes as "second" at the last line of the claim.

As to claim 4, it is unclear whether "obtaining a listing of motes appropriate to at least one of the one or more multi-mote content indexes" further limits the step of aggregating or the step of creating, as in claim 3. It is further unclear whether the multi-mote content indexes are of the first set or the second set, as per amended claim 3.

As to claims 5-7, analogous clarity issues exist as those discussed above with respect to claim 4.

As to claim 8, it is unclear whether “receiving at the second mote at least a part of at least one of a mote-addressed sensing index or a mote-addressed control index from a reporting entity at a mote of the first set of motes” further limits the step of aggregating or the step of creating, as in claim 3.

As to claim 9, it is unclear whether “receiving at the second mote at least a part of at least one of a mote-addressed routing index from a reporting entity at a mote of the first set of motes” further limits the step of aggregating or the step of creating, as in claim 3.

As to claim 10, it is unclear as to whether “mote-addressed content indexes” as in claim 1 are the same or different from “multi-mote content indexes”. If “multi-mote content indexes" received are different from content indexes that are aggregated then it appears that steps of receiving and aggregating are unrelated. If, on the other hand, "multi-mote content indexes" that are received are the same content indexes that are aggregated in the second mote, then it is unclear why inconsistent terminology is used when referring the same elements in the claim.

As to claim 16, it is unclear which mote is part of which set of motes. Claim 1 specifies that aggregating is performed in at least one mote of a second set of motes. Claim 1 also specifies that content indexes of a first set of motes are aggregated. In claim 16, a first mote of the first set of motes receives the agent and the agent is

installed at the first mote (of the first set of motes). It appears that the agent is to be installed at a mote of the second sent of motes, as per claim 1, in order to perform aggregation of the content indexes of the first set of motes.

As to claim 35, it is unclear how can said at least one mote-addressed content index comprise a second mote and a second multi-mote index creation agent, as claimed. It is further unclear which mote and which multi-mote index creation agent is the "second" mote and the "second" multi-mote index creation agent since none of claims 34 and 35 recite a "first" mote and the "first" multi-mote index creation agent. For the purposes of examination "at least one mote" is interpreted to include "second mote" and "at least one multi-mote index creation agent" is interpreted to include "second multi-mote index creation agent".

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. (US 2002/0161751 A1) in view of “TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks” by Samuel Madden et al.

As to claim 33, Mulgund teaches:

a mote comprising a device formed in a substrate having at least two of a semi-autonomous computing functionality, a communication functionality, or a sensing functionality [at least one sensing node (2) in the first set of sensing nodes (Fig. 1) comprising a computational device being a small embedded platform that has one or more sensors (16)] (par. [0026]); and

means for aggregating at least a part of one or more mote-addressed content indexes corresponding to content of a first type from a first set of motes [sensor network modeling agent (14)] (Fig. 2) and for aggregating at least a part of one or more mote-addressed content indexes corresponding to content of a second type from a second set of motes [each Node Data Table contains node's unique address, which identifies a sensing function of that node] (par. [0029], [0042] in Mulgund), said means for aggregating being coupled [being connected by a network] with a reporting entity [software application programming interface (API) and hardware implementation], and reporting an aggregation of at least a part of one or more mote-addressed content indexes from the first set of motes and second set of motes [software API allows the network modeling agent to access a node on the network and retrieve information stored in a knowledge base (18) of the node] (par. [0026], [0044]), and wherein the first set of motes is administered by a first network administrator [set of nodes at the left of Fig. 1 is administered by a first network access point] and wherein the second set of motes is administered by a second network administrator [set of nodes at the right of Fig. 1 is administered by a second network access point].

Mulgund does not teach the reporting entity disposed proximate to said mote, said reporting entity being operable to report aggregations of content indexes from both sets.

Madden teaches:

a reporting entity at a mote [TinyOS], said reporting entity being operable to report an aggregation of at least a part of one or more mote-addressed content indexes from the first set of motes and second set of motes [a collection phase, where the aggregate values are continually routed up from TinyOS of children nodes to parents] (abstract, section 1.1 par. 2, section 4, 4.1 pars. 1-2, and 4.2; Fig. 2 in Madden).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having the reporting entity disposed proximate to said mote, said reporting entity being operable to report aggregations of content indexes from both sets in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

15. Claims 17, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. and in further view of Simon et al.

It is noted that claims are examined as best understood.

As to claim 17, Mulgund teaches:

an agent [sensor network modeling agent (14)] (Fig. 1) to aggregate at least a part of one or more mote-addressed content indexes corresponding to a first type of content [type of data output provided by each sensor of the node] (par. [0026], [0029] in Mulgund) from a first set of motes [aggregating indexing information related to sensor data outputs stored in Sensor Data Table 24. It is well known to one of ordinary skill in the art that such indexing data allows one to distinguish between different sensor data outputs, as discussed in connection with relational databases of Figs. 3 and 4] (abstract, par. [0005] and [0025], Figs. 3 and 4), and to aggregate on a mote at least a part of the one or more second mote-addressed content indexes corresponding to a second type of content from the second set of motes [as discussed per first set, wherein Mulgund teaches having two sets of motes], wherein the first set of motes is administered by a first network administrator [set of nodes at the left of Fig. 1 is administered by a first network access point] and wherein the second set of motes is administered by a second network administrator [set of nodes at the right of Fig. 1 is administered by a second network access point].

Mulgund also teaches that each node contains some local memory or other knowledge base for recording sensor output data, which can be retrieved by interrogating the node (par. [0030]), which suggests to one of ordinary skill in the pertinent art that there exists some *agent resident in a mote* that collects data from sensors and stores it in the local knowledge base. However, such local agent, *per se*, is not explicitly shown.

Madden teaches an agent **resident in a mote** [a TinyDB, which is a distributed query processor that runs on each of the nodes in a sensor network] (section 1 Introduction, par. 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having an agent **resident in the mote** in order to select, join, project, and aggregate data from the sensors (section 1 Introduction, par. 4 in Madden).

As to claim 38, Mulgund teaches:

a first mote [node (2)] (Fig. 1) comprising a first content type [type of data output provided by each sensor of the node] (par. [0026], [0029] in Mulgund) and administered by a first network administrator [first network access point at the left of Fig. 1]; and

at least one multi-mote registry [Nodes Table (20)], said at least one multi-mote registry having one or more indicators of a second mote's content to be indexed (par. [0037], [0061] and [0063], second column (CAL) in table 1), said second mote content to be indexed comprising a second content type [type of data output provided by each sensor of the node] (par. [0026], [0029] in Mulgund) and said second mote administered by a second network administrator [second network access point at the right of Fig. 1].

Mulgund does not teach that at least one multi-mote registry is resident in said first mote.

Madden teaches a multi-mote registry [a short list] resident in a mote (under 2.2 Communication in Sensor Networks, par. 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having a multi-mote registry resident in the mote in order to keep a list of neighbors who they have heard transmit recently, as well as some routing information about the connectivity of those neighbors (under 2.2 Communication in Sensor Networks, par. 2) (analogous to information about child nodes in Mulgund, Table 1, second column).

As to claim 39, Mulgund shows that the one or more indicators of a second mote's content to be indexed comprise one or more mote-network addresses of the second mote's content to be indexed [unique address of a node that stores node's content] (par. [0037]).

16. Claims 1-4, 7-11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. (US 2002/0161751 A1) in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. and in further view of Simon et al. (US Patent 7,665,126 B2).

It is noted that claims are examined as best understood.

As to claim 1, Mulgund teaches:

aggregating at least a part of one or more mote-addressed content indexes from a first set of motes [aggregating indexing information related to sensor data outputs stored in Sensor Data Table 24. It is well known to one of ordinary skill in the art that such indexing data allows one to distinguish between different sensor data outputs, as

discussed in connection with relational databases of Figs. 3 and 4] (abstract, par. [0005] and [0025], Fig. 3, Fig. 4), wherein the first set of motes [nodes to the left of Fig. 1] is administered by a first network administrator [first network access point to the left of Fig. 1] and wherein the second set of motes [nodes to the right of Fig. 1] is administered by a second network administrator [second network access point to the right of Fig. 1].

Mulgund does not teach that said aggregating is performed in at least one mote in a second set of motes. Mulgund is silent as to whether the first and second network access points are owned or controlled by different legal entities.

Madden teaches aggregating at least a part of one or more mote-addressed indexes [sensor attributes, such as group id] from the first set of motes as performed in at least one mote [parent node] in a second set of motes [a collection phase, where aggregate values are continually routed up from children to parents] (abstract, section 1.1 par. 2, section 4, 4.1 pars. 1-2, and 4.2; Fig. 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by aggregating said indexes at a mote in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

Simon is directed to a method of controlling access of mesh routers to a network resources based on information contained in a certificate associated with the particular router. See abstract. Simon teaches the first set of devices (104C) is administered by a first network administrator (102C) controlled by a first legal entity [mesh router 102C is

controlled by the associated certificate (202C)] and wherein the second set of devices (104B) is administered by a second network administrator (102B) controlled by a second legal entity [mesh router 102B is controlled by the associated certificate (202B)] (Figs. 1 and 2; col. 3 lines 4-18; col. 4 lines 23-32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden by having the first and second network access points being owned or controlled by different legal entities in order to introduce control and/or accountability into spontaneously-formed wireless networks (col. 1 lines 43-45 of Simon).

As to claim 2, Mulgund shows:

receiving at least a part of one or more mote-addressed indexes of the first set of motes [retrieving the information stored at the nodes] (par. [0025], [0062]).

Mulgund does not show that said receiving is performed at a second mote in the second set of motes.

Madden shows receiving at a second mote in the second set of motes [parent node] at least a part of one or more mote-addressed indexes of the first set of motes [sensor attributes, such as group id, in a collection phase, where aggregate values are continually routed up from children to parents] (abstract, section 1.1 par. 2, section 4, 4.1 pars. 1-2, and 4.2; Fig. 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by receiving said indexes at a second mote

in the second set of motes in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

As to claim 3, Mulgund shows:

aggregating at least a part of one or more mote-addressed content indexes from the first set of motes, as discussed per claim 1, the content indexes comprising information indicating a first type of sensing or control capabilities associated with the first set of motes [indexing information of Mulgund includes node's unique address, wherein it is known a priori what type of output a particular node provides. Each Node Data Table contains node's unique address, which identifies a sensing function of that node] (par. [0029], [0042] in Mulgund); and

creating one or more multi-mote content indexes of the first set of motes and one or more multi-mote content indexes of the second set of motes (Fig. 4, par. [0042]).

Mulgund does not show that said aggregating and said creating is performed at the second mote.

Madden shows aggregating and creating at least a part of one or more mote-addressed indexes of the first set of motes [sensor attributes, such as group id] being performed at a second mote [parent node] [a collection phase, where aggregate values are continually routed up from children to parents] (abstract, section 1.1 par. 2, section 4, 4.1 pars. 1-2, and 4.2; Fig. 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by aggregating and creating said indexes at a second mote in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

As to claim 4, Mulgund in view of Madden shows:

obtaining a listing of motes appropriate to at least one of the one of more multi-mote content indexes (pars [0035] and [0037] in Mulgund).

As to claim 7, Mulgund in view of Madden shows:

obtaining a listing of motes appropriate to at least one of the one or more multi-mote content indexes (pars [0035] and [0037] in Mulgund) from one or more motes to be included in the listing (par. [0061] and [0062] in Mulgund) wherein the second column in table 1 (CAL) shows the current links from the Node being visited.

As to claim 8, Mulgund in view of Madden shows:

receiving at the second mote at least a part of at least one of a mote-addressed sensing index from a reporting entity at a mote of the first set of motes [a collection phase, where the aggregate values are continually routed up from TinyOS of children nodes to parents] (abstract, section 1.1 par. 2, section 4, 4.1 pars. 1-2, and 4.2; Fig. 2 in Madden).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by receiving at a second mote at least a part of at least one of a mote-addressed sensing index from a reporting entity at a mote of the first set of motes in order to lower the number of message transmissions, latency, and power consumption than the server-based approach (as taught by Mulgund) (Madden, section 4 under In-Network Aggregates).

As to claim 9, Mulgund in view of Madden shows receiving at the second mote at least a part of at least one of a mote-addressed routing index from a reporting entity at a mote of the first set of motes (section 2.1 Ad-Hoc Routing Algorithm of Madden).

As to claim 10, Mulgund in view of Madden shows:

receiving at a second mote from the first set of motes at least a part of one or more multi-mote content indexes of the first set of motes, as discussed per claim 8, above.

As to claim 11, Mulgund in view of Madden shows:

receiving at the second mote at least a part of at least one of a mote-addressed sensing index from a multi-mote reporting entity at a mote of the first set of motes, as discussed per claim 8, above.

As to claim 13, Mulgund shows:

creating an aggregate of at least a part of one or more multi-mote content indexes of the first set of motes (abstract, paragraph [0005] and [0025], Fig. 3, Fig. 4), wherein the one or more multi-mote content indexes include identifiers of devices available at a mote of the first set of motes, and information indicating sensing and control capabilities associated with the devices [indexing information of Mulgund includes node's unique address, wherein it is known a priori what type of output a particular node provides. Each Node Data Table contains node's unique address, which identifies a sensing function of that node] (par. [0029], [0042] in Mulgund).

As to claim 14, Mulgund in view of Madden shows aggregating on a second set of motes at least a part of a mote-addressed routing index of a multi-mote content index of the first set of motes (section 2.1 Ad-Hoc Routing Algorithm of Madden).

17. Claims 18-20, 23-27, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of in view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. (hereinafter Madden *ACQP*) and in further view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. (hereinafter Madden *TAG*).

It is noted that claims are examined as best understood.

As to claims 18-20, 23-27, 29, and 30, Mulgund in view of Madden ACQP and Madden TAG teaches all the elements, as discussed above with respect to claims 2-4, 7-11, 13, and 14.

18. Claims 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. and in further view of Simon et al.

It is noted that claims are examined as best understood.

As to claim 34, Mulgund teaches:

at least one mote comprising a device formed in a substrate having at least two of a semi-autonomous computing functionality, a communication functionality, or a sensing functionality [at least one sensing node (2) in the first set of sensing nodes (Fig. 1) comprising a computational device being a small embedded platform that has one or more sensors (16)] (par. [0026]); and

at least one multi-mote index creation agent [sensor network modeling agent (14)] (Fig. 1), said at least one multi-mote index creation agent configured to index at least a part of at least one mote-addressed content index including an index of content of a first set of motes and a second set of motes [network modeling agent creates a relational database containing indexing information related to sensor data outputs stored in Sensor Data Table 24. It is well known to one of ordinary skill in the art that such indexing data allows one to distinguish between different sensor data outputs, as discussed in connection with relational databases of Figs. 3 and 4] (Fig. 3 and par. [0037]), wherein the first set of motes [nodes to the left of Fig. 1] is administered by a first network administrator [first network access point to the left of Fig. 1] and wherein

the second set of motes [nodes to the right of Fig. 1] is administered by a second network administrator [second network access point to the right of Fig. 1].

Mulgund also teaches that each node contains some local memory or other knowledge base for recording sensor output data, which can be retrieved by interrogating the node (par. [0030]), which suggests to one of ordinary skill in the pertinent art that there exists some *agent resident in a mote* that collects data from sensors and stores it in the local knowledge base. However, such local agent, *per se*, is not explicitly shown. Mulgund is further silent as to whether the first and second network access points are owned or controlled by different legal entities.

Madden shows a multi-mote index creation agent **resident in a mote** [a TinyDB, which is a distributed query processor that runs on each of the nodes in a sensor network] (section 1 Introduction, par. 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund by having a multi-mote index creation agent being **resident in the mote** in order to select, join, project, and aggregate data from the sensors (section 1 Introduction, par. 4 in Madden).

Simon is directed to a method of controlling access of mesh routers to a network resources based on information contained in a certificate associated with the particular router. See abstract. Simon teaches the first set of devices (104C) is administered by a first network administrator (102C) controlled by a first legal entity [mesh router 102C is controlled by the associated certificate (202C)] and wherein the second set of devices (104B) is administered by a second network administrator (102B) controlled by a

second legal entity [mesh router 102B is controlled by the associated certificate (202B)] (Figs. 1 and 2; col. 3 lines 4-18; col. 4 lines 23-32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden by having the first and second network access points being owned or controlled by different legal entities in order to introduce control and/or accountability into spontaneously-formed wireless networks (col. 1 lines 43-45 of Simon).

As to claim 35, Mulgund in view of Madden and Simon teaches a second mote included within the second set of motes [same mote as the “at least one mote" of claim 34]; and a second multi-mote index creation agent resident in said second mote, said second multi-mote index creation agent configured to index content of said at least one mote [same multi-mote index creation agent as the “at least one multi-mote index creation agent" of claim 34, wherein reasons for rejection are analogous to those of claim 34 above].

As to claim 36, Mulgund in view of Madden shows:

a processor (section 2.1 Properties of Sensor Devices, par. 2 in Madden) configured to execute the at least one multi-mote index creation agent to obtain at least a sensing function (par. [0042] lines 16-19 in Mulgund).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Mulgund to include a processor in order to process

data that is being stored in a knowledge base and respond to interrogation requests (Fig. 2 in Mulgund).

As to claim 37, Mulgund in view of Madden shows that said at least one mote comprises a processor, a memory, and a communications devices formed from a substrate (par. [0026] in Mulgund; section 2.1 in Madden).

19. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. in view of Simon et al. and in further view of Chiloyan et al. (US Patent No.: 7,165,109).

It is noted that claims are examined as best understood.

As to claim 5, Mulgund in view of Madden shows:

a listing of motes appropriate to at least one of the one or more multi-mote content indexes (pars [0035] and [0037] in Mulgund) from a multi-mote registry [Nodes Table (20)].

Chiloyan further shows:

obtaining a listing of devices from a registry [having an operational system accessing device registry to check if the particular peripheral device model is included in the current device registry] (col. 1 lines 50-65).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden and Simon by obtaining a

list of devices from a registry in order to check if the particular device model and necessary information about the device is in the registry (col. 1 lines 58-63 in Chiloyan).

As to claim 6, Mulgund in view of Madden shows:

a pre-loaded listing of motes [initial model construction listing] (par. [0046] in Mulgund) appropriate to at least one of the one or more multi-mote content indexes (par. [0035] and [0037] in Mulgund).

Chiloyan further shows:

obtaining a pre-loaded listing of devices [devices already included in the current device registry] (col. 1 lines 50-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden and Simon by obtaining a pre-loaded list of devices in order to check if the particular device model and necessary information about the device is already included in the registry (col. 1 lines 58-63 in Chiloyan).

20. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of in view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. (hereinafter *Madden ACQP*) in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. (hereinafter *Madden TAG*) and in further view of Chiloyan et al.

It is noted that claims are examined as best understood.

As to claims 21 and 22, Mulgund in view of Madden ACQP, Madden TAG, and Chiloyan shows all the elements, as discussed above with respect to claims 5 and 6.

21. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. in view of Simon and in further view of News Release article titled "Tiny Sensor-Based Computers Could Help Track Wildlife" dated Nov. 6, 2003 (hereinafter *News Release*) (cited in IDS dated 12/18/09).

It is noted that claims are examined as best understood.

As to claim 12, Mulgund in view of Madden shows receiving at the second mote at least a part of a mote-addressed routing index from a multi-mote reporting entity at a mote of the first set of motes (section 2.1 Ad-Hoc Routing Algorithm of Madden).

Mulgund in view of Madden and Simon does not expressly show receiving a mote-addressed spatial index.

News Release teaches receiving a mote-addressed spatial index from a multi-mote reporting entity [computer base station receiving GPS sensor's readings that are stored in mote's memory] (par. 5 and 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden and Simon by receiving a mote-addressed spatial index from a multi-mote reporting entity in order to effectively track the location of the mote in space and the entity to which the mote is attached to (par. 1-6 in News Release).

As to claim 15, Mulgund in view of Madden shows aggregating at least a part of a mote-addressed routing index of a multi-mote content index, as discussed per claim 14 above.

Mulgund in view of Madden and Simon does not expressly show a mote-addressed spatial index.

News Release teaches a mote-addressed spatial index [computer base station receiving GPS sensor's readings that are stored in mote's memory] (par. 5 and 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden and Simon by having a mote-addressed spatial index in addition to a mote-addressed routing index in order to effectively track the location of the mote in space and the entity to which the mote is attached to (par. 1-6 in News Release).

22. Claims 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of in view of "The Design of an Acquisitional Query Processor For Sensor Networks" by Samuel Madden et al. (hereinafter *Madden ACQP*) in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. (hereinafter *Madden TAG*) and in further view of News Release article titled "Tiny Sensor-Based Computers Could Help Track Wildlife" dated Nov. 6, 2003 (hereinafter *News Release*) (cited in IDS dated 12/18/09).

It is noted that claims are examined as best understood.

As to claims 28 and 31, Mulgund in view of Madden ACQP, Madden TAG, and News Release teaches all the elements, as discussed above with respect to claims 12 and 15.

23. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of "TAG: a Tiny Aggregation Service for Ad-Hoc Sensor Networks" by Samuel Madden et al. (hereinafter *Madden TAG*) in view of Simon et al. in view of "TinyDB: In-Network Query Processing in TinyOS" by Sam Madden (hereinafter *Madden TinyDB*) (see IDS dated 06/17/09 cite # AK) and in further view of "Mate: A Tiny Virtual Machine for Sensor Networks" by Levis et al. (see IDS dated 04/22/04 cite # AZ).

It is noted that claims are examined as best understood.

As to claim 16, Madden TinyDB teaches:

installing the received multi-mote index creation agent at the first mote [a TinyDB, which is a distributed query processor that runs on each of the nodes in a sensor network and is a TinyOS component] (section 2 Introduction, page 5); and

receiving at least a part of one or more mote-addressed content indexes of the second mote with the multi-mote index creation agent installed on the first mote (section 2.1 System Overview, page 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden TAG, and Simon, by installing the received multi-mote index creation agent at the first mote and receiving at

least a part of one or more mote-addressed content indexes of the second mote with the multi-mote index creation agent installed on the first mote in order to collect data from motes in the environment, filter it, aggregate it together, and route it out to a PC using power-efficient in-network processing algorithms (Madden TinyDB page 5).

Mulgund in view of Madden TAG, Simon, and Madden TinyDB does not expressly teach transferring a multi-mote index creation agent, which aggregates at least a part of one or more mote-addressed content indexes received from a mote, to a first mote of the first set of motes from a second mote. In Madden TinyDB, the TinyDB component is installed directly onto the mote by connecting the mote to the programming board (see page 8).

Levis discusses a tiny virtual machine for sensor networks. In particular, Levis teaches packet sending and reception capsules that enable the deployment of ad-hoc routing and data aggregation algorithms. (see abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mulgund in view of Madden and Simon by transferring the multi-mote index creation agent (TinyDB component) from one mote to another mote, as taught by Levis (see section 4.4 Code Infection) in order to reprogram motes in the network when they are physically unreachable (i.e. can't be connected directed to the programming board, as taught by Madden TinyDB) (abstract of Levis).

24. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mulgund et al. in view of “The Design of an Acquisitional Query Processor For Sensor Networks”

by Samuel Madden et al. (hereinafter *Madden ACQP*) in view of "TinyDB: In-Network Query Processing in TinyOS" by Sam Madden (hereinafter *Madden TinyDB*) (see IDS dated 06/17/09 cite # AK) and in further view of "Mate: A Tiny Virtual Machine for Sensor Networks" by Levis et al. (see IDS dated 04/22/04 cite # AZ).

It is noted that claims are examined as best understood.

As to claim 32, Mulgund in view of Madden ACQP, Madden TinyDB and Levis teaches all the elements, as discussed above with respect to claim 16.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OLEG SURVILLO whose telephone number is (571)272-9691. The examiner can normally be reached on M-Th 8:30am - 6:00pm; F 8:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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